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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/615,976	07/10/2003	Toru Futami	240108US3	3393

22850 7590 10/02/2006

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EXAMINER	
LEUNG, JENNIFER A	
ART UNIT	**PAPER NUMBER**
1764	

DATE MAILED: 10/02/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/615,976	FUTAMI ET AL.	
	Examiner	Art Unit	
	Jennifer A. Leung	1764	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *20 July 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-34* is/are pending in the application.

4a) Of the above claim(s) *25-34* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-24* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☒ Claim(s) *1-34* are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *10 July 2003* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *5-25-04; 7-10-03*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Election/Restrictions

1. Applicant's election with traverse of Group I, claims 1-24, in the reply filed on July 20, 2006 is acknowledged. The traversal is on the ground(s) that,

> "The claims of the present invention would appear to be part of an overlapping search area. Accordingly, the Applicants respectfully traverse the outstanding restriction requirement on the grounds that a search and examination of the entire application would not place a *serious* burden on the Examiner."

This is not found persuasive for the same reasons of the previous Office Action. For instance, the fact that the inventions are separately classified indicates that each invention would require a different and non-overlapping field of search, thereby creating a sufficient burden on the Examiner. The requirement is still deemed proper and is therefore made FINAL.

2. Claims 25-34 are withdrawn from further consideration pursuant to 37 CFR 1.142(b), as being drawn to a nonelected invention, there being no allowable generic or linking claim.

Specification

3. The abstract of the disclosure is objected to because the abstract should be limited to a single paragraph containing 50 to 150 words. Correction is required. See MPEP § 608.01(b).

4. The lengthy specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

Drawings

5. Figures 1, 2, 3(a)-(c), 4(a)-(b) and 5(a)-(b) should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g). Corrected

drawings in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Objections

6. Claim 23 is objected to because the limitation, "are formed in a two-dimensionally or a three dimensionally" in lines 3-4 should be changed to --are formed two-dimensionally or three-dimensionally-- for proper grammatical form. Appropriate correction is required.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

7. Claims 1-24 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Regarding claim 1, it is unclear as to where the body of the claim begins (i.e., does the body of the claim begin at "comprising" at line 1, or is Applicant attempting to recite a Jepson claim wherein the body of the claim beings at the phrase "characterized in that" at line 9?).

Regarding claim 6, it is unclear as to the structural limitation Applicant is attempting to recite by, "at least one absent location of partition wall except the vicinity of the confluent portion and the vicinity of the branch portion of the fine channel".

Regarding claim 13, it is unclear as to the structural limitation Applicant is attempting to recite by, "amicability to hydrophilic/hydrophobic properties to a kind of fluid fed into the fine channel." It appears that the limitation is incomplete, or in an improper grammatical form.

Regarding claim 14, it is unclear as to the structural limitation Applicant is attempting to recite by, "hydrophilic properties of a material for the inner wall at one side of the fine channel partitioned by partition walls are different from hydrophilic properties of the fluid fed into the fine channel." The "fluid fed into the fine channel" is not considered an element of the apparatus.

Regarding claim 23, it is unclear as to the structural limitation Applicant is attempting to recite (e.g., is Applicant attempting to claim a device comprising a plurality of fine channels, or is Applicant reciting a product-by-process claim containing a fine channel forming method?).

Regarding claim 24, it is unclear as to where the body of the claim begins (i.e., does the body of the claim begin at "comprising" at line 1, or is Applicant attempting to recite a Jepson claim wherein the body of the claim beings at the phrase "characterized in that" at line 9?). Furthermore, it is unclear as to the structural limitation Applicant is attempting to recite by, "at least one absent location of partition wall except the vicinity of the confluent portion and the vicinity of the branch portion of the fine channel" (lines 14-17).

Claim Rejections - 35 USC § 102 and § 103

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an

> international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

8. Claims 1-3 and 10-17 are rejected under 35 U.S.C. 102(e) as being anticipated by Young et al. (US 2003/0226806).

Regarding claim 1, Young et al. (FIGs. 1-4; sections [0034-[0040]) discloses a fine channel device **5** comprising a fine channel **10** provided with at least two inlet ports **110**, inlet channels (i.e., ingress channels **100**) communicating with the inlet ports **110**, a confluent portion (i.e., at the point where inlet channels **100** intersect to form diffusion channel **10**) communicating with the inlet channels **100**, a branch portion (i.e., at the point where the diffusion channel **10** splits to form two outlet channels **100**) communicating with the fine channel **10**, from which at least two outlet channels (i.e., egress channels **100**) are branched, and outlet ports **110** communicating with the outlet channels **100**; wherein the fine channel **10** is provided with a plurality of partition walls (i.e., channel structures **200**) arranged along a boundary formed by at

least two kinds of fluid fed from the inlet ports **110**.

Regarding claim 2, the plurality of partition walls **200** are arranged with intervals **205** in a flowing direction of fluid (see FIG. 4).

Regarding claim 3, the height of partition walls **200** is substantially the same as the depth **D** of the fine channel **10** (see FIG. 2).

Regarding claim 10, in the vicinity of the inlet channels **100** and/or the outlet channels **100**, at least two partition walls **200** are connected continuously (i.e., via a membrane **300**) in a flowing direction of fluid (see FIGs. 4,11).

Regarding claim 11, a plurality of projections (i.e., channel structures **400**) are formed at the inner wall of the fine channel partitioned by partition walls (see FIG. 12).

Regarding claim 12, the apparatus of Young et al. structurally meets the claims because the flow direction of the fluids is considered intended use. In any event, Young et al. further discloses that the inlet ports **110** for feeding fluid, the inlet channels **100** communicating with the inlet ports **110**, the outlet channels **100**, and the outlet ports **110** communicating with the outlet channels **100** (FIG. 1) are arranged so that the flowing direction of either one of at least two kinds of fluid fed in the fine channel **10** is opposite to the flowing direction of the other of said at least two kinds of fluid fed adjacently in the fine channel **10** (i.e., counter-current flow; see FIG. 9; also sections [0043]-[0045]).

Regarding claims 13 and 14, as best understood, the inner wall at one side of the fine channel **10** partitioned by partition walls **200** has amicability to hydrophilic/hydrophobic properties to a kind of fluid fed into the fine channel, and the hydrophilic properties of a material for the inner wall at one side of the fine channel **10** partitioned by partition walls **200** may be

different from hydrophilic properties of the fluid fed into the fine channel (i.e., by preferentially making the exposed surfaces of the channels and channel structures hydrophobic or hydrophilic; see section [0049]).

Regarding claims 15 and 16, a film (i.e., a polymer membrane **300**; FIG. 11 and section [0047]) having fine pores of a diameter smaller than any distance **205** between adjacent partition walls **200** is provided between adjacent partition walls **200** in a flowing direction of fluid.

Regarding claim 17, a metallic film may be disposed in the entire or a part of the inner surface of the fine channel and/or the wall surface of the partition walls (i.e., a final passivation layer **440** such as sputtered or evaporated metal; section [0052]).

Instant claims 1-3 and 10-17 structurally read on the apparatus of Young et al.

9. Claims 4, 7, 9, 19 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Young et al. (US 2003/0226806).

Regarding claim 4, FIG. 4 shows that the partition walls **200** are provided at positions apart from the confluent portion or the branch portion of the device (see also FIGs. 1 and 3). Although the illustrations do not show the partition walls **200** being provided at positions apart from *both* the confluent portion and the branch portion of the device, Young et al. (sections [0041]-[0042]) further discloses that the diffusive transfer of a constituent through the interfacial boundary can be controlled by simply varying the dimensions, shape and/or grouping/spacing of the partition walls **200** within the fine channel **10**. Thus, it would have been obvious for one of ordinary skill in the art at the time the invention was made to configure the partition walls **200** in the device of Young et al. as instantly claimed, on the basis of suitability for the intended use thereof, because it has been held that where the general conditions of a claim are disclosed in the

prior art, discovering the optimum or workable ranges involves only routine skill in the art, *In re Aller, 105 USPQ 233.*

Regarding claim 7, Young et al. (sections [0041]-[0042]) discloses that the diffusive transfer of a constituent through the interfacial boundary can be controlled by simply varying the dimensions, shape and/or grouping/spacing of the partition walls **200** within the fine channel **10**. Thus, it would have been obvious for one of ordinary skill in the art at the time the invention was made to configure the maximum length of a partition wall **200** in a flowing direction of fluid to be less than any distance **205** between adjacent partition walls **200** in the flowing direction of fluid in the apparatus of Young et al., on the basis of suitability for the intended use thereof, because where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art, *In re Aller, 105 USPQ 233.*

Regarding claim 9, Young et al. (sections [0041]-[0042]) discloses that the diffusive transfer of a constituent through the interfacial boundary can be controlled by simply varying the dimensions, shape and/or grouping/spacing of the partition walls **200** within the fine channel **10**. Thus, it would have been obvious for one of ordinary skill in the art at the time the invention was made to configure, in the vicinity of the inlet channels **100** and/or the outlet channels **100**, a distance **205** between adjacent partition walls **200** in a flowing direction of fluid that was smaller than a distance **205** between adjacent partition walls **200** in the flowing direction of fluid in a portion other than the vicinity of the inlet channels **100** and/or the outlet channels **100** in the apparatus of Young et al., on the basis of suitability for the intended use thereof, because where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art, *In re Aller, 105 USPQ 233.*

Regarding claims 19 and 20, Young et al. further discloses the provision of, "appropriate fluid connections (not shown) for the attachment of a fluid conducting mechanism, such as a capillary or reservoir, to the device," (section [0038]). Although Young et al. is silent as to the instantly claimed configuration of a pump, circulating channel and reservoir tank, it would have been obvious for one of ordinary skill in the art at the time the invention was made to configure the device of Young et al. as instantly claimed, because the Examiner takes Official Notice that the provision of such fluid conducting mechanisms, on the basis of suitability for the intended use, is within the level of ordinary skill in the art.

10. Claims 5, 6 and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Young et al. (US 2003/0226806) in view of Giddings (US 4,894,146).

Regarding claim 5, Young et al. (sections [0041]-[0042]) discloses that the diffusive transfer of a constituent through the interfacial boundary can be controlled by simply varying the dimensions, shape and/or grouping/spacing of the partition walls **200** within the fine channel **10**. Young et al., however, is silent as to whether the partition wall **200** located closest to the branch portion of the fine channel **10** may be connected to the branch portion. Giddings teaches a fine channel device (FIG. 3) comprising a partition wall being connected to the branch portion (i.e., an "outlet splitter" identified as element **15d** in the figures). It would have been obvious for one of ordinary skill in the art at the time the invention was made to configure the partition walls **200** in the device of Young et al. as instantly claimed, on the basis of suitability for the intended use thereof, because the provision of a partition wall connected to the branch portion (i.e., in the form of an "outlet splitter") improves the separation of the plural layers of fluid at the branch portion of the device, as taught by Giddings.

Regarding claims 6 and 24, Young et al. (FIGs. 1-4; sections [0034-[0040]) discloses a fine channel device **5** comprising a fine channel **10** provided with at least two inlet ports **110**, inlet channels (i.e., ingress channels **100**) communicating with the inlet ports **110**, a confluent portion (i.e., at the point where inlet channels **100** intersect to form diffusion channel **10**) communicating with the inlet channels **100**, a branch portion (i.e., the point where the diffusion channel **10** splits to form outlet channels **100**) communicating with the fine channel **10**, from which at least two outlet channels (i.e., egress channels **100**) are branched, and outlet ports **110** communicating with the outlet channels **100**; wherein the fine channel **10** is provided with a plurality of partition walls (i.e., channel structures **200**) arranged along a boundary formed by at least two kinds of fluid fed from the inlet ports **110**; and wherein each partition wall **200** has a height substantially the same as the depth **D** of the fine channel **10** (see FIG. 2). Young et al. (sections [0041]-[0042]) further discloses that the diffusive transfer of a constituent through the interfacial boundary can be controlled by simply varying the dimensions, shape and/or grouping/spacing of the partition walls **200** within the fine channel **10**. Young et al., however, does not specifically disclose the embodiment wherein there is at least one absent location of partition wall **200** except the vicinity of the confluent portion and the vicinity of the branch portion of the fine channel **10**. Giddings teaches a fine channel device wherein there is at least one absent location of partition wall except the vicinity of the confluent portion and the vicinity of the branch portion of the fine channel (as shown in FIG. 3, there is at least one absent location of partition wall, except for partition wall **15a** located in the vicinity of the confluent portion and except for partition wall **15d** located in the vicinity of the branch portion of the device). It would have been obvious for one of ordinary skill in the art at the time the invention was made to

configure the partition walls **200** in the device of Young et al. as instantly claimed, on the basis of suitability for the intended use, because the claimed configuration improves the splitting of the plural fluid streams into their physically distinct laminae, as taught by Giddings.

11. Claims 8, 18 and 21-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Young et al. (US 2003/0226806) in view of Christel et al. (US 6,368,871).

Regarding claim 8, Young et al. is silent as to a portion of the fine channel **10** having a shape other than a straight shape, with the partition wall **200** in said portion extending from the vicinity of a portion originating a non-straight portion of fine channel **10** to the vicinity of a portion ending the non-straight portion of fine channel **10**. Christel et al. teaches a fine channel device comprising a portion of the fine channel **110** having a shape other than a straight shape, with the partition wall **111** in said portion extending from the vicinity of a portion originating a non-straight portion of fine channel to the vicinity of a portion ending the non-straight portion of fine channel (i.e., a plurality of U-shaped fine channel portions, each containing a U-shaped micro-column or island; see bottom image of FIGs. 1g). It would have been obvious for one of ordinary skill in the art at the time the invention was made to configure the fine channel **10** in the apparatus of Young et al. as instantly claimed, on the basis of suitability for the intended use, because the configuration of a non-straight portion containing a partition wall in addition to a straight portion allows for the formation of a fine channel device having a great fine channel length on a given area of substrate.

Regarding claim 18, Young et al. is silent as to the provision of a current supply means and/or a voltage supply means for the metallic film. Christel et al. teaches the provision of a current supply means and/or a voltage supply means (i.e., via an AC or DC voltage; see column

8, line 14 to column 9, line 28). It would have been obvious for one of ordinary skill in the art at the time the invention was made to provide a current supply means and/or a voltage supply means for the metallic film in the device of Young et al., on the basis of suitability for the intended use thereof, because the current supply and/or voltage supply means further aids in the separation of molecules in the device via a change in polarity, as taught by Christel et al.

Regarding claims 21 and 22, Young et al. is silent as to the fine channel device further comprising a means for supplying energy to fluid flowing through the fine channel **10**. Christel teaches the provision of means, such as a heating device (column 9, lines 29-37), for supplying energy to fluid flowing through the fine channel. It would have been obvious for one of ordinary skill in the art at the time the invention was made to provide a means for supplying energy to the apparatus of Young et al., because the means (i.e., a heating device) would provide additional functional capabilities to the apparatus, as taught by Christel (see column 9, lines 31-35).

Regarding claim 23, the fine channel **10** of Young et al. is formed two-dimensionally or three-dimensionally (e.g., by etching; see sections [0051]). Furthermore, it would have been obvious for one of ordinary skill in the art at the time the invention was made to configure a plurality of fine channels **10** in the device of Young et al., on the basis of suitability for the intended use, because a plurality of fine channels allows for an increase in the duration of diffusive mixing, as evidenced by Christel et al. (see FIG. 4; column 4, lines 23-28). In addition, it has been held that duplication of part was held to have been obvious. *St. Regis Paper Co. v. Beemis Co. Inc.* 193 USPQ 8, 11 (1977); *In re Harza* 124 USPQ 378 (CCPA 1960).

12. Claims 1-4, 8, 12-14 and 21-23 are rejected under 35 U.S.C. 102(b) as being anticipated by Christel et al. (US 6,368,871).

Regarding claim 1, Christel et al. discloses a fine channel device (see FIGs. 3-5, 1f, 1g; column 2, line 56 to column 3, line 10) comprising a fine channel (i.e., contact or interdiffusion region **110**) provided with at least two inlet ports; inlet channels (i.e., deep channels **101** and **102**) communicating with the inlet ports; a confluent portion (i.e., the point of intersection of channels **101** and **102**) communicating with the inlet channels; a branch portion (i.e., at the point where channel **110** splits into channels **103** and **104**) communicating with the fine channel **110**, from which at least two outlet channels **103** and **104** are branched; and outlet ports communicating with the outlet channels **103** and **104**; wherein the fine channel **110** is provided with a plurality of partition walls (i.e., micro-columns **111**; see also column 7, lines 40-54) arranged along a boundary formed by at least two kinds of fluid fed from the inlet ports.

Regarding claim 2, the plurality of partition walls **111** are arranged with intervals in a flowing direction of fluid (see FIGs. 5, 1f and 1g).

Regarding claim 3, as best shown in FIG. 1f, the height of the partition walls **111** is substantially the same as the depth of the fine channel **110** (see also column 7, lines 40-54).

Regarding claim 4, partition walls **111** are provided at positions apart from the confluent portion and the branch portion (see FIG. 5).

Regarding claim 8, a portion of the fine channel **110** has a shape other than a straight shape, and the partition wall **111** in said portion extends from the vicinity of a portion originating a non-straight portion of fine channel to the vicinity of a portion ending the non-straight portion of fine channel (i.e., a plurality of U-shaped fine channel portions, each containing a U-shaped micro-column or island; see bottom image of FIGs. 1g).

Regarding claim 12, the device of Christel et al. structurally meets the claim because the

direction of fluid flow is considered intended use.

Regarding claims 13 and 14, as best understood, the inner wall has amicability to hydrophilic/hydrophobic properties to a kind of fluid fed into the fine channel, wherein the hydrophilic properties of a material are different from hydrophilic properties of the fluid fed into the fine channel (see column 7, lines 1-9 and 18-21; column 6, lines 14-20).

Regarding claims 21 and 22, Christel et al. further discloses means for supplying energy to fluid flowing the fine channel (i.e., a heating device; see column 9, lines 19-37).

Regarding claim 23, a plurality of fine channels **110** (FIG. 5) are formed two-dimensionally or three dimensionally (e.g., by etching on silicon, etc.; see column 5, line 44 to column 6, line 26).

Instant claims 1-4, 8, 12-14 and 21-23 structurally read on the apparatus of Christel.

13. Claims 5, 6 and 24 are rejected under 35 U.S.C. 103(a) as obvious over Christel et al. (US 6,368,871) in view of Giddings (US 4,894,146).

Regarding claim 5, Christel is silent as to whether the partition wall **111** located closest to the branch portion of the fine channel may be connected to the branch portion. Giddings teaches a fine channel device (FIG. 3) comprising a partition wall being connected to the branch portion (i.e., an "outlet splitter" identified as element **15d** in the figures). It would have been obvious for one of ordinary skill in the art at the time the invention was made to configure the partition walls **111** in the device of Christel et al. as instantly claimed, on the basis of suitability for the intended use thereof, because the provision of a partition wall connected to the branch portion (i.e., in the form of an "outlet splitter") improves the separation of the plural layers of fluid at the branch portion of the device, as taught by Giddings.

Regarding claims 6 and 24, Christel et al. discloses a fine channel device (see FIGs. 3-5, 1f, 1g; column 2, line 56 to column 3, line 10) comprising a fine channel (i.e., contact or interdiffusion region **110**) provided with at least two inlet ports; inlet channels (i.e., deep channels **101** and **102**) communicating with the inlet ports; a confluent portion (i.e., the point of intersection of channels **101** and **102**) communicating with the inlet channels; a branch portion (i.e., at the point where channel **110** splits into channels **103** and **104**) communicating with the fine channel **110**, from which at least two outlet channels **103** and **104** are branched; and outlet ports communicating with the outlet channels **103** and **104**; wherein the fine channel **110** is provided with a plurality of partition walls (i.e., micro-columns **111**; see also column 7, lines 40-54) arranged along a boundary formed by at least two kinds of fluid fed from the inlet ports; and wherein the height of the partition walls **111** is substantially the same as the depth of the fine channel (see FIG. 1f; also column 7, lines 40-54). Christel et al., however, does not specifically disclose the embodiment wherein there is at least one absent location of partition wall **111** except the vicinity of the confluent portion and the vicinity of the branch portion of the fine channel. Giddings teaches a fine channel device wherein there is at least one absent location of partition wall except the vicinity of the confluent portion and the vicinity of the branch portion of the fine channel (as shown in FIG. 3, there is at least one absent location of partition wall, except for partition wall **15a** located in the vicinity of the confluent portion and except for partition wall **15d** located in the vicinity of the branch portion of the device). It would have been obvious for one of ordinary skill in the art at the time the invention was made to configure the partition walls **111** in the device of Christel et al. as instantly claimed, on the basis of suitability for the intended use, because the claimed configuration improves the splitting of the plural fluid streams into their

physically distinct laminae, as taught by Giddings.

14. Claims 7, 18 and 19 are rejected under 35 U.S.C. 103(a) as obvious over Christel et al. (US 6,368,871).

Regarding claim 7, as illustrated in FIG. 5, it appears that the maximum length of a partition wall (i.e., in this case, the diameter of the structure **111**) in the flowing direction of fluid is less than any distance between adjacent partition walls **111** in the flowing direction of the fluid. Although the dimensions of the partition walls **111** and the spacing between partition walls **111** is not specifically stated, Christel et al. further discloses,

> "The microcolumns may be of any shape or size so as to provide a high surface area array. The individual columns are preferably round, square, or rectangular. The height of any individual column may vary and can be of any size, preferably ranging from about 20 to about 1000 microns. It is generally desirable to use high aspect ratio microcolumns (ratio of height to width and/or diameter), such as 2:1, preferably 10:1, more preferably 20:1. The columns may be uniform in size and shape, or individually eccentric..." (column 7, lines 40-48).

Therefore, it would have been obvious for one of ordinary skill in the art at the time the invention was made to configure the partition walls **111** in the apparatus of Christel et al. as instantly recited, on the basis of suitability for the intended use thereof, because it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art, *In re Aller, 105 USPQ 233.*

Regarding claims 18 and 19, Christel et al. discloses the provision of a current supply means and/or a voltage supply means (i.e., an AC or DC voltage; column 8, line 14 to column 9, line 15) for an underlying conductor disposed in the entire or a part of the inner surface of the

fine channel and/or the wall surface of the partition walls. Christel et al., however, is silent as to the underlying conductor comprising a metallic film. In any event, it would have been obvious for one of ordinary skill in the art at the time the invention was made to select a metallic film for the underlying conductor in the device of Christel et al., on the basis of suitability for the intended use thereof, because the Examiner takes Official Notice that the use of metallic films as electrically conductive materials is well known in the art.

Conclusion

15. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure:

WO 99/09042 is further cited to illustrate the state of the art. This document claims priority to US Application Serial No. 08/910,434, which is US Patent No. 6,368,871 cited in the rejections above.

* * *

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jennifer A. Leung whose telephone number is (571) 272-1449. The examiner can normally be reached on 9:30 am - 5:30 pm Monday through Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Glenn A. Caldarola can be reached on (571) 272-1444. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Jennifer A. Leung
September 25, 2006

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PRIMARY EXAMINER